

## DETERMINATION OF THERMAL NEUTRON CAPTURE CROSS SECTIONS USING COLD NEUTRON BEAMS

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Neutron cross sections of the components of nuclear fuels, long-lived nuclear waste and structural materials used in reactor and accelerator based nuclear energy production and transmutation systems are of special significance. The thermal cross section is an important normalization point used in the processing and evaluation of neutron resonance data. Its accurate value is sometimes difficult to determine by integral measurements, such as by the neutron activation method, due to the improper knowledge of the neutron energy distribution and the inaccuracy of radioactive decay data.

Intense guided beams of cold neutrons provide the means to determine accurately the cross section for capture (and fission) at the thermal energy, without the disturbing effect of resonances. For capture, the cross section can be inferred from the partial production cross sections of the primary or ground-state transitions measured relative to an internal standard, or from the beta decay lines. Using a beam chopper and a digital analyzer enable accurate activation measurements of ground state and isomer cross sections on very short-lived reaction products.

The capabilities of the new method developed at the Budapest cold neutron facility are demonstrated by recent results for the fuel element constituent  $^{238}\text{U}$  and for the most important long-lived fission products,  $^{99}\text{Tc}$  and  $^{129}\text{I}$ .